OWNER/OPERATOR:

COID: 15793

RIVERSIDE COUNTY WASTE MANAGEMENT DEPT, LAMB
14310 FREDERICK STREET
MORENO VALLEY, CA 92553

CONTACT PERSON: MARK HUNT
SENIOR CIVIL ENGINEER
(951) 486-3247

EQUIPMENT LOCATION:

LAMB CANYON SANITARY LANDFILL
16411 LAMB CANYON RD & HWY 79
BEAUMONT, CA 92223

EQUIPMENT DESCRIPTION

A/N 500899
LANDFILL GAS FLARING SYSTEM CONSISTING OF:

1. LIQUID KNOCKOUT/PARTICULATE REMOVAL VESSEL, JOHN ZINK, WITH DEMISTER.

2. BLOWER, LANDFILL GAS, AEROVENT, 2000 SCFM MAXIMUM FLOW RATE.

3. FLARE NO. 1, JOHN ZINK, 7'-0" DIA. X 30'-0" H., WITH A MULTI JET BURNER, A PROPANE GAS PILOT, ELECTRIC IGNITER, UV FLAME SENSOR, THERMOCOUPLE WITH TEMPERATURE INDICATOR AND RECORDER, AUTOMATIC SHUTDOWN AND ALARM SYSTEM, AUTOMATIC COMBUSTION AIR REGULATING SYSTEM, TEMPERATURE CONTROLLER AND A FLAME ARRESTOR.

(SEE SAMPLE PERMIT)

A/N 500900
TV REVISION (DE MINIMUS SIGNIFICANT)

INTRODUCTION:

This application was submitted 07-28-09 as a Class I for modification of the existing landfill gas flare by increasing the heat input from 20.7 mmbtu/hr to 54.6 mmbtu/hr and increasing the flow rate of lfg from 760 scfm to 2000 scfm. The flare is currently under a Permit to Construct A/N 391030 as described under Section H of the facility's TV permit (revision 0 issued 9/9/08).

Initial source test was conducted in 2003 by URS.
A source test was conducted in 2008 by AirX Testing.

PROJECT DESCRIPTION:

Hours of operation are 24 hr/day, 7 days/week.

(see attached John Zink specs dated August 31, 2000)
Equipment is a John Zink flare, rated at 200 - 2000 scfm of 50% CH4. Given a lower heating value of 455 btu/scf, the heat rate of the flare ranges from 5.5 mmbtu/hr to 55 mmbtu/hr. The requested increase in flow and heat input will be within the design parameters of the flare.

CALCULATIONS:

PreMod emissions from NSR in A/N 391030

NOx:

NOx emission factor of 0.0527 lb/mmbtu is used to keep emissions increase below significance level. 2003 test shows NOx 0.032 lb/mmbtu

PostMod NOx (max) = (0.0527 lb/mmbtu)(54.6 mmbtu/hr)
= 2.88 lb/hr
*24 = 69.06 lb/day
*365 = 25206.2 lb/yr
= 12.6 tpy

PreMod NOx = 1.24 lb/hr
= 29.76 lb/day
= 30 lb/day, 30 day avg

Increase = 2.88 – 1.24 lb/hr = 1.64 lb/hr
*24 = 39.36 lb/day increase

CO:

PostMod CO (max) = (0.20 lb/mmbtu)(54.6 mmbtu/hr)
= 10.92 lb/hr
*24 = 262.1 lb/day
*365 = 95659.2 lb/yr
= 47.8 tpy

PreMod CO = 4.14 lb/hr
= 99.36 lb/day
= 101 lb/day, 30-day avg.

Increase = 10.92 – 4.14 lb/hr = 6.78 lb/hr
*24 = 162.72 lb/day increase

ROG:

Assume 10000 ppm inlet (this value was used in Permit to Construct, 2003 test shows 10579 ppm)
PostMod R1(ROG)(max) = (10000 ppm)(2000 scfm)(16 lb/lbm)(lbm/379 cf)(1E-6)(60)
= 50.66 lb/hr

PostMod R2(ROG)(max) = (50.66 lb/hr)(1-0.98)
= 1.01 lb/hr
*24 = 24.3 lb/day
*365 = 8875.6 lb/yr
= 4.4 tpy

PreMod ROG = 0.39 lb/hr
= 9.36 lb/day
= 9 lb/day, 30-day avg.

Increase = 1.01 – 0.39 lb/hr = 0.62 lb/hr
*24 = 14.88 lb/day increase

SOx:

Assume H2S = 40 ppm (P/C used 40 ppm, 2003 test showed H2S at 19.5 ppm)

PostMod SOx(max) = (40 ppm H2S)(lbmSO2/lbmH2S)(64 lbSO2/lbmSO2)(lbm/379 cf)
*(2000 scfm)(60)(1E-6)
= 0.81 lb/hr
*24 = 19.45 lb/day
*365 = 7100.45 lb/yr
= 3.6 tpy

PreMod SOx = 0.31 lb/hr
= 7.44 lb/day
= 8 lb/day, 30 day avg.

Increase = 0.81 – 0.31 lb/hr = 0.50 lb/hr
*24 = 12 lb/day increase

PM10:

PM10 emission factor of 17.7 lb/mmbtu is used so that emissions increase is below significance levels. 2003 test show PM10 = 4 lb/mmcf

PostMod PM/PM10(max) = (17.7 lb/mmcf)(2000 scfm)(1E-6)(60)
= 2.12 lb/hr
*24 = 50.98 lb/day
*365 = 18606.2 lb/yr
= 9.3 tpy

PreMod PM/PM10 = 0.91 lb/hr
= 21.84 lb/day
= 22 lb/day, 30 day avg.

Increase = 2.12 – 0.91 lb/hr = 1.21 lb/hr
* 24 = 29.0 lb/day increase

Emissions Summary:

	PreMod		**PostMod**			**Increase**	
	Lb/hr	Lb/day	Lb/hr	Lb/day	Lb/yr	Lb/hr	Lb/day
NOx	1.24	30	2.88	69.06	25206.2	1.64	39
CO	4.14	101	10.92	262.1	95659.2	6.78	161
ROG	0.39	9	1.01	24.3	8875.6	0.62	15
SOx	0.31	8	0.81	19.45	7100.45	0.5	11
PM10	0.91	22	2.12	50.98	18606.2	1.21	29

Modeling Analysis:
Since the heat input 54.6 mmbtu/hr is greater than 40 mmbtu/hr, Table A-1 of R1303 cannot be used. SCREEN3 will be used.

Heat Input = 54.6 mmbtu/hr
*252.16 cal/btu*hr/60 min*min/60 sec*1E6 = 3.82E6 cal/sec

Stack Height = (30 ft)(m/3.281 ft) = 9.14 m
Stack Diam. = (7 ft)(m/3.281 ft) = 2.13 m
Exhaust temp = 1000 degrees F = 811 R = 1084 K

NOx = 2.04 lb/hr
*464 gr/lb*hr/60 min*min/60 sec = 0.263 gr/sec

CO = 6.78 lb/hr
*464 gr/lb*hr/60 min*min/60 sec = 0.874 gr/sec

PM = 2.8 lb/hr
*464 gr/lb*hr/60 min*min/60 sec = 0.361 gr/sec

Exhaust Flow Rate Calculation:
Flare = 2000 scfm of 50% CH4 and 50% CO2

At 50% CH4 of 2000 scfm or 1000 SCFM of CH4 (assuming 20% excess air(EA))
Products of combustion = 1000 scfm * 13.5 (where 13.5 from Table 142 of AP40)
= 13500 scfm

Exhaust flow rate = 13500 + 1000 (CO2 Flare 3)
= 14,500 scfm

Actual flow rate of the flue gas from the flare: Assume T outlet of flare = 1000 degrees F (811 degrees R) after atmospheric quenching.
ACFM = 14500 [(460+1000)/(460+60)]
= 4071105 ACFM @ 1000 degree F

Modeling results show the following: (see attached SCREEN3 printouts)

	Max conc. at 118 m. (ug/m3)	Conc. at 300 m. (ug/m3)	Significant Change in AQ (ug/m3)
NOx 1-hr	4.077	2.032	20
NOx annual (*0.1)	0.4077	0.2032	1
CO 1-hr	16.89	8.415	1100
CO 8-hr (*0.8)	13.51	6.732	500
PM10 1-hr	3.015	1.502	N/A
PM10 24 hr (*0.4)	1.21	0.601	2.5
PM10 annual(*0.1)	0.302	0.150	1

The maximum NOx, CO and PM10 concentrations are below the respective Significant Change in AQ concentrations.

No modeling required for SOx and ROG

Health Risk Assessment (Tier 2):

See Excel Spreadsheet
Assume 2000 dscfm inlet flow
Assume 95% destruction efficiency
Use inlet concentrations from 2003 source test
Residential receptor = 300 meters (from A/N 391030)
Commercial receptor = 300 meters (from A/N 391030)
MET station = Banning

MICR residential is 0.395 in a million
MICR commercial is 0.0.0772 in a million

HIA and HIC are less than one.

EVALUATION:

Rules:

212: Emission increases are below threshold amounts. No public notice is required before permit issuance.

401: Visible emissions are not expected.

402: Nuisance is not expected with proper operational procedures and mitigation measures.

403: Fugitive emissions are not expected with water spraying.

431.1: H2S inlet concentration is 20 ppm (based on 2003 test), which is less than the 150 ppm allowed by this rule.
Emissions as H2S are: (20 ppm)(1025 scfm)(34 lb/lbm)(1E-6)(lbm/379 cf)(60)(24)
= 2.6 lb/day, which is less than 5 lb/day.
Since the emissions as H2S are less than 5 lb/day, a continuous sulfur monitoring system is not required.
Compliance with this rule expected.

1150.1: This system is required per this rule. Based on the 2003 test, ROG emissions from control device is 1.84 ppm as hexane, which is less than the 20 ppm as

hexane allowed with a 99.59% DRE, which is better than the 98% required. Even with the increase in heat input and lfg flow rate, the flare should continue to comply with 1150.1 requirements.

Reg 13: This modification has an emissions increase, so it is subject to Reg 13 requirements.
BACT/LAER: This equipment meets the 0.06 lb/mmbtu NOx limit, 0.2 lb/mmbtu CO limit, the 0.6 second retention time and the 1400 degrees F in the stack. See flare specs in "appendix B" of A/N 391030.
Modeling: Modeling shows that NOx, CO and PM10 increases are below Significant Change in AQ Concentration (Table A-2)

Offsets: These emissions increases qualify for Priority Reserve.

CEQA: A NOE was prepared by Riverside County was released for comment November 5, 2009. No comments were received.

1401: MICR based in Tier 2 for both residential and commercial is less than one in a million. Hazard indices are less than one.

40CFR60 Subpart WWW: Based on the 2003 and 2008 results, NMOC as hexane were measured at 1.84 ppm (99.6%) and 2.1 ppm, respectively. This is less than the allowable 20 ppm or 98% destruction efficiency. Continued compliance is expected.

40 CFR 63 Subpart AAAA: Compliance with this subpart is expected since the equipment complies with WWW.

Title V: This is a TV facility currently operating under a TV Permit issued September 9, 2008. This permit will be issued as a De Minimus Significant Revision under A/N 500900 after a 45-day EPA notice.

CONCLUSION:

This project will meet all District Rules and Regulations. It is recommended that a Permit to Operate be granted subject to the attached conditions after completion of the EPA 45-day notice.